# Regional Development in the Damodar Valley region of Jharkhand - A Geographical Study

**Ph. D Synopsis**

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**Topic:**

**Regional Development in the Damodar Valley region of Jharkhand - A Geographical Study**

## A BRIEF INTRODUCTION OF THE RESEARCH TOPIC:

Damodar Valley region is located in a very sensitive geographical zone (1). The economy of the area is largely dependent on mining and allied industries (2). Since last few decades coal mining industry is under stress due to environmental reasons (3). The arbitrary and sudden closing of many coal mines has impacted the economy as well as social status of the local people. It is one of the most industrialised parts of India having many steel plants and other factories (4).

The study area is changing landuse and demographic changes in the area. It will help to analyse the level of socio economic development and disparities of the study area. The present study is highly justified in respect to enlighten the land use and socio economical changing pattern over times.

Thus, the present study identified the foremost problems in the study region and scrutinized their regional disparities and development.

## STATE OF THE ART:

Research Problem The main economic spine of the Damodar Valley region is the existence of coal mines (5). The darker side of the production of this valuable resource is the unfolding of a human catastrophe. Over past two decades many economic factors such as overproduction, fluctuation of coal price in global market, increased competition from other countries, incidence of accidents in mines, deterioration of land and water quality has led to the abandonment and closure of several mines in the study area.

According to Chowdhury,S., Chattopadhay,G.S. and Das,N.(2012) Damodar River basin plays a vital role for ecological balance and provides the life supporting system of large number of flora and fauna since millions of years (6) (7). From prehistoric time human civilization evolved along this river basin (8). In the upper catchment plateau area was covered with dense tropical forest (9) where tribal societies lived for thousands of years. The upper catchment is also rich in terms of coal, minerals etc (10). The exploration of coal and mineral resources started during the colonial phase

of industrialization began the destruction of the dense forests ecosystem of the upper catchment of the Damodar Basin (11). Mining and destruction of forests since last two hundred years causes soil erosion resulting heavy siltation in Damodar (12) which disturbs the sediment water balance of the river eco-system. The soil erosion also results vast track of non-productive wasteland. The development and ecology are in the crossroads in Damodar basin. The presence of coal and mineral belts helps in initiating mining and industrial operations in the basin since last 150 years (13).

C.R Pathak(1980) analyse that in the Damodar Valley region as in the country as a whole, urbanisation is rather a consequential phenomenon to industrialisation, and has a time lag of about 10 to 20 years. Even in the rate of growth, industrialisation has been faster than urbanisation, with a definite trend of accelerated rate of urbanisation during the following decades. While mining activities are negatively correlated with urbanisation, there is a high positive correlation between manufacturing and construction and urbanisation .

The poly-nuclear origin and independent location of factory towns along the river Damodar has resulted in a belted corridor pattern of urban development (14).

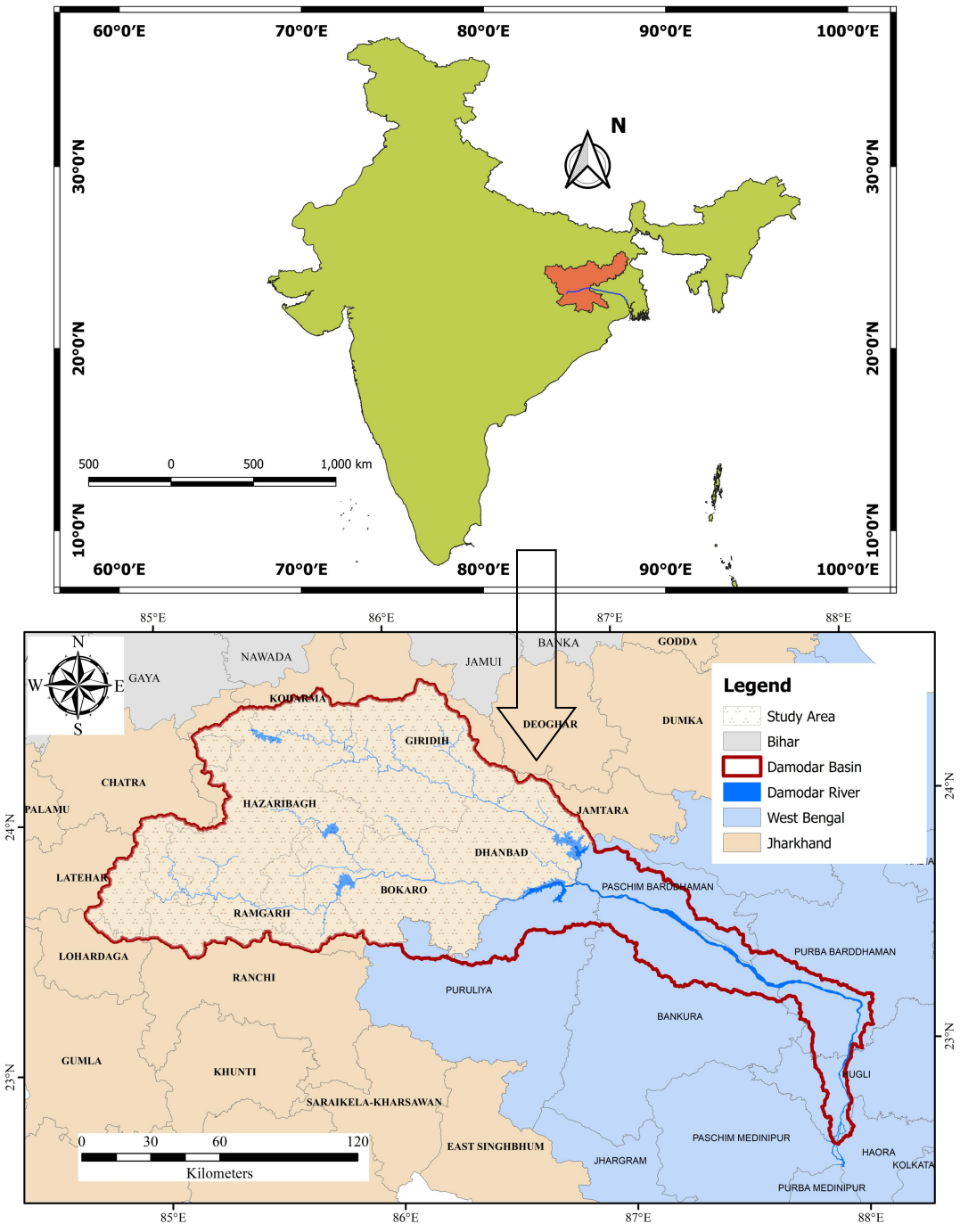
To access the pattern of disparities in socio-economical development O. Ramphul (2012) explain that different indicators of development is assessed separately for agricultural, industrial and infrastructural sectors and it will be classified into different development categories according to the value of the constructed development index (15).

The study area Damodar valley region of Jharkhand mainly located in the upper catchment in upland plateau region with forest and mineral resources at the north and west and the lower catchment with fertile alluvium plain land at the east and south. As such the former is industrially strong and the latter agriculturally.

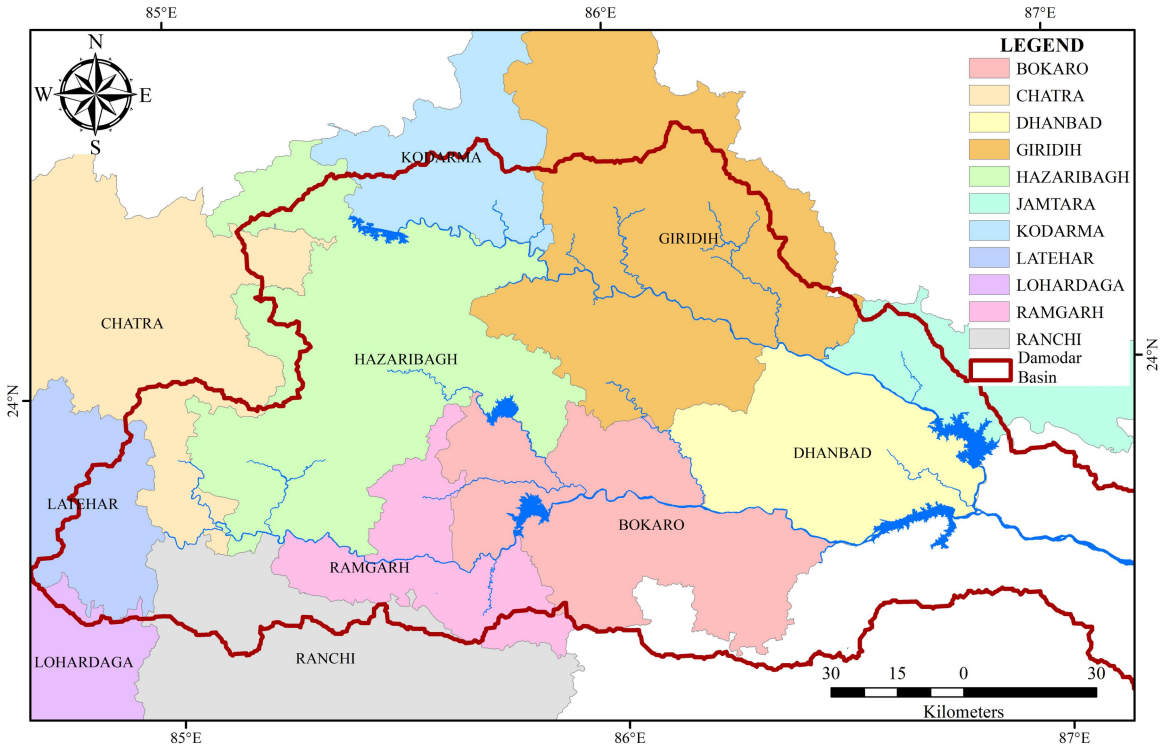
The Damodar River Basin is a sub-basin of the Bhagirathi- Hooghly River system of West Bengal. Its funnel-shaped basin area is about 23,370.98 sq. km, spreading in the states of Jharkhand (73.7 %) and West Bengal (26.3 %) (16).

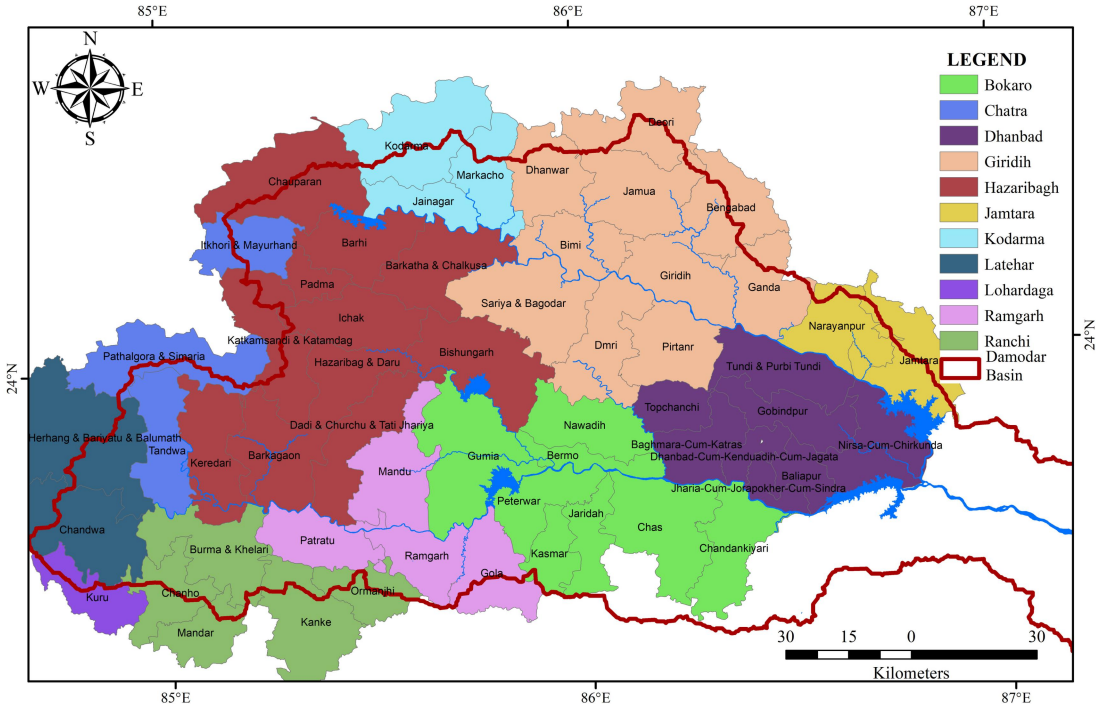
The Damodar Valley is spread across fully covered 2 districts (Dhanbad, Bokaro) and partly covered 9 districts (Hazaribag,Koderma,Chatra, Ramgarh, Ranchi,Lohardaga,Latehar, Giridih and Dumka) which consists around 66 blocks in Jharkhand .Among 25820 sq km area the study covered 17110 sq. km (17).

## LOCATION OF THE STUDY AREA



# DAMODAR VALLEY REGION JHARKHAND



## PROBLEMS TO BE INVESTIGATED:

1. To identify disparities in the levels of economic and social development of the study area

2. To explain these disparities in the context of physical resource base, stage of technological advancement and nature of infrastructural framework of the areas;

3. To analyse the effect of mining and allied industries on the pattern of regional development of the study area.

4. To study the present landuse and landcover of the study area and develop a change detection landuse model and predict the future landuse.

## OBJECTIVE OF THE INVESTIGATION AND MOTIVATION:

1. To assess the variations in the physical, demographic and infrastructural characteristics of the study area,

2. To investigate the variation in the level of resource base and industrialization and its impact on study area.

3. To evaluate the effect of mining and industry on the pattern of regional development through urbanization.

4. To analyse the regional disparity in landuse and landcover and predict the future landuse of the area.

## RESEARCH QUESTIONS:

The research questions are as follows:

1. Whether the demographic, socio- economic and infrastructural growth has been uniform throughout the study area considering a more or less uniform physical background?

2. Whether the availability or resources and industrialization has affected the infrastructural development of the area?

3. Whether mining and industry has influenced the pattern of urbanization in regional development?

4. Whether the present landuse pattern indicates a uniform and sustained growth by 2030?

## RESEARCH DESIGN AND METHODOLOGY:

The research design is a conceptual framework within which the research work will be completed to achieve the research goal. It is needed to develop a proper research plan to execute the study objectives. It is also necessary to measure and analyze the collected data from different sources. The present study will be mainly based on secondary data and the present research work will be done into three basic steps:

i) Data collection,

ii) Data analysis and

iii) Preparing the report.

- The selected geographic area of Damodar River Basin of Jharkhand is covered by seven SOI 1:250,000 topographical sheets: 72H, 72L, 73A, 73E, 73I, 79A and 79B.

- The land use change study will go through the phase of Image processing, Image classification and analysis of imageries.

  For the studying spatial variation the data of landuse and landcover maps from Multi temporal satellite imageries will be collected for the study from LANDSAT satellite images. Multi temporal satellite imageries of the study area of the year 2001, 2011 and 2021 should be geo-coded and geo-referenced using the base map. On the basis of the collected data and the map, numerous thematic maps have to be prepared to understand the land use dynamicity over the time. A Predictive Model will be developed to predict the land use for the year 2030 using 'Cellular Automata Markov Model' in Arc GIS software. 'MARKOV MODEL' for the prediction of geographical characteristics by using 'IDRISI' software will be created.

The study will be also execute with the help of different Remote Sensing Softwares like, QGIS-3.14, ArcGIS 10.4, Erdas Imagine 2014, TerreSet 2020 and Fragstat 4.2 along with MS Excel and MS Word etc and the data which are used in this study subsequently processing including layer stack, georeferencing and supervised classification. Simple analysis will be performed to prepare final layouts and appropriate results are drawn. After generating the image classification generation future prediction of landuse can be done for the study area.

Data analysis will be done using block level secondary data from Census of India series, NSS and NFHS for measuring socio economic components. Multivariate analysis will be done to assess the levels of development.

- **Principal Component Analysis Method** will be used to assess the relative levels of development. This method is based on restrictive assumption regarding the development indicators.
- **Multiple Factor Analysis Method** deals with the data table which is a set of individuals describe by several sets of variables.
- In the **Monetary Index Method**, the socio economic development indicators are converted into monetary value and total of this value is taken as the composite Index of development.
- **Aggregation method** uses a simple addition of the values of the socio-economic developmental indicators as Composite Index of development
- In **Ranking method** each unit is allotted ranks based on different socio economic developmental indicators. Sum of the rank for all the socio economical indicators of the unit is taken as the composite index of development.
- **Weighted Index Method** will be generated to show the different variables of development.

Report writing will be started after collecting, processing, and analysing all dataset. The method of interpretation and explanation of the study will be in clear and simple manner for the better understanding of the research findings.

**Tentative chapterisation**

**Introduction**

**Chapter 1:** Geographical background of the study area

**Chapter 2:** Socio economic variations in the growth of the area

**Chapter 3**: Resource availability, industrial development and its impact on infrastructure

**Chapter 4:** Impact of industrial development on urbanization

**Chapter 5:** Measuring levels of regional development

**Chapter 6:** Environmental degradation and sustainable growth

**Summary and Conclusion**

## SOURCES OF DATA AND TOOLS TO BE USED IN THE COLLECTION OF DATA:

The study will mainly based on secondary sources like, books, published and unpublished materials, journals, documents, websites and other government or nongovernmental records etc. The study method would include:

- Secondary data collection will be gathered through Government and non-governmental reports, Departmental reports, Census data, Geological Survey of India, Survey of India, Coal Atlas of India, Damodar valley Corporation, Planning Atlas: Damodar valley, Statistical handbooks, Books, Research publications, Journals, Published Ph. D thesis etc.
- Collection of Satellite imageries for Landsat satellite image data of different years which are freely accessed from the Landsat archive of the United States Geological Survey (USGS) websites area (https://glovis.usgs.gov./) (https://earthexplorer.usgs.gov/), Topographical sheets from Survey of India also needed to study. For the primary level observation many tools also necessary to collect the data like Germin e Trex 10 GPS, camera e.t.c.

## ANALYSIS OF DATA:

Different methods will be adopted for processing of data. The base map of the study area will be digitized by Arc GIS to create land use and land cover maps, ERDAS Imagine 2014, Arc GIS, TerreSet 2020 software will be used.

Finally, Change Detection Analysis for the years under study will be conducted and a land transformation matrix from the different selected year(2001, 2011 and 2021) will be created. A Predictive Model will be developed to predict the land use for the year 2030 using 'Cellular Automata Markov Model' in Arc GIS v.10.8 software. 'MARKOV MODEL' for the prediction of geographical characteristics by using 'IDRISI' software will be created. Then 'CELLULAR AUTOMATA (CA) MODEL' for the geospatial elements will be generated which emphasize the dynamics of various change events by using 'IDRISI'. Then the predicted land use map of 2030 will be validated with the original base map.

The data collected from different sources is stored and processed using SPSS25, MS Office2019 e.t.c. Block wise level of development and socio-economically vulnerable blocks are identified through quantitative analysis.

## SIGNIFICANCE OF THE STUDY:

- The study will help to analyse the pattern of regional development in the Damodar Valley region of Jharkhand
- The study will help in predicting the future of landuse changes thereby indicating a sustainable future.

## ITS RELEVANCE TO THE PRESENT DAY PROBLEM AND NEEDS TO THE SOCIETY:

- This research will be very helpful to highlight the nature and development of mining and allied industries and its impact on urbanization of the study area.
- The research will focus on socio economical and infrastructural setup to show the disparity and diversity of the study area.
- The study will provide an insight into reality and try to address the problem from the perspective of a regional planner.

- It will help policy makers to frame robust policies addressing the needs of the people who are living in the study area.

## CONTRIBUTION TO THE EXISTING KNOWLEDGE:

The research is expected to contribute to the existing ambit of knowledge by highlighting the socio economic disparity, diversity and levels of development in the Damodar valley region of Jharkhand.

## FUTURE WORK:

The study will offer recommendations for the regional planner and policy makers and further encourage to framing different strategies over entire Damodar valley region of Jharkhand where the river and its basin continues to be the major lifeline.

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